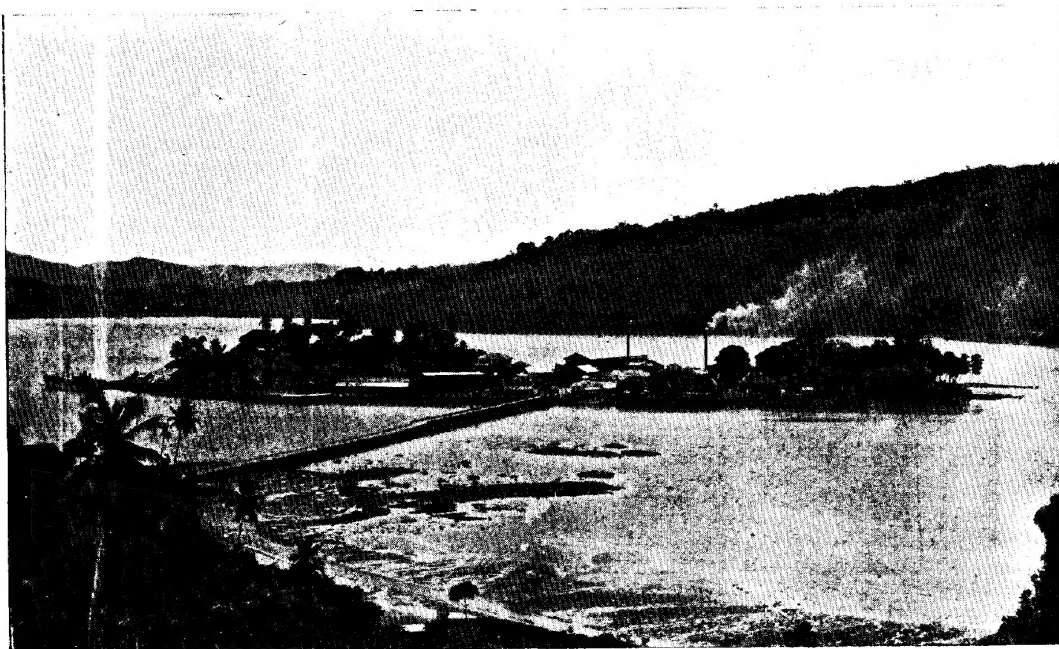


ANDAMAN FORESTS AND THEIR REPRODUCTION.

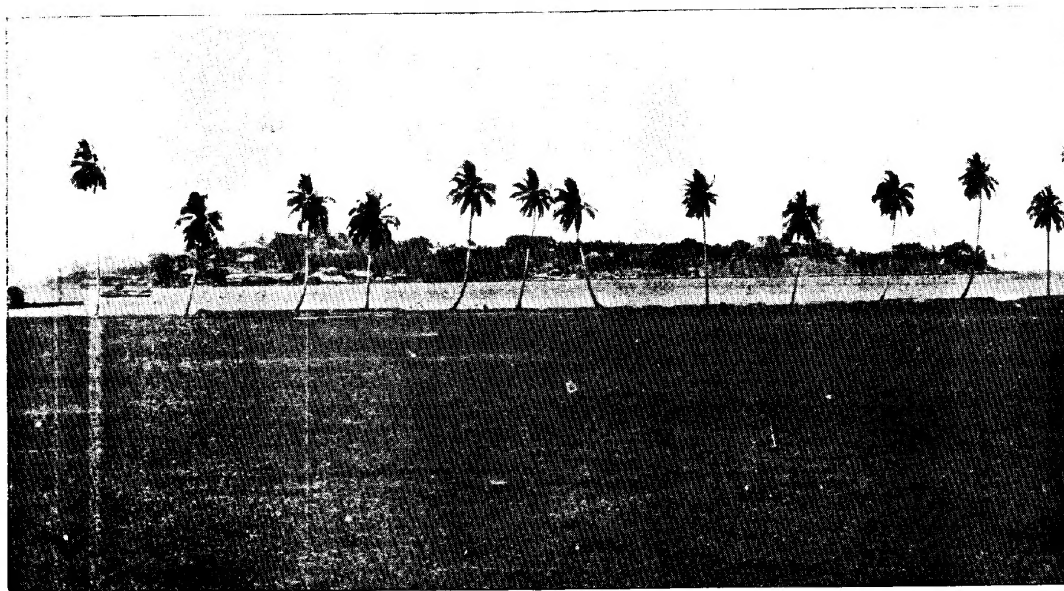
BY B. S. CHENGAPA, P.F.S.

Part I.—The Forest Types.

“ I say, what have *you* done to be sent to the Andamans ? ”
was the *greeting* of many of my friends in Coorg when they heard
that I was to be posted here. “ It is my past *karma*,—perhaps
I murdered some one in my last life and escaped punishment ” was
my response in the usual Indian manner. The late Mr. Worsley,



Port Blair Harbour—Chatham Island—the Pivot of the Forest Department.



Photos B. S. Chengapa.

Ross Island, the Seat of the Local Government.

I.C.S., then Chief Commissioner of these Islands, in an after-dinner speech shortly after his arrival in Port Blair said that his friends in Simla when they heard of his posting wanted to know what he was being sent down here for? There is no doubt but that from the Himalayas down to Cape Comorin and among both the higher and the lower order of society in India, the prevalent belief is that the Andamans is the home of the worst type of anophelene mosquitoes and sandflies, thieves and robbers, dacoits and murderers and all that is worst in God's creation.

It was to such a land that I was irresistibly driven by the Fates to seek my bread. I therefore felt as though I were being marched to the fatal steps of the guillotine in the days of the reign of terror in France when I boarded the good ship "Maharaja" with my wife to share my exile and landed in Port Blair four years ago.

In Port Blair, when I saw the delightful and picturesque country, a beautiful harbour with two or three ocean-going ships at anchor and at the jetty, busy emptying or filling their holds with cargo, a dozen or more steam tugs and launches ploughing their way to and fro through the still waters of this fine harbour; and when I saw the Aberdeen bazaar which any Indian town may justly be proud of, with its electric lighting and telephonic communication, when I saw some 200 or more motor cars and buses, busy plying up and down to the jetty, the bazaar and elsewhere, two huge government sawmills and the local match factory all with their tall smoking chimneys, and when I saw even a cinema hall, full to the brim with the vivacious and care free Burmans dressed in their multicoloured *aingis* and *lungis* I heaved a sigh of relief and felt myself transported to the veritable fairyland of Hans Anderson.

It is true that the majority of the population are murderers and dacoits, but they are all labelled with a number and not one of them can go about in the garb of a saint or a gentleman as they frequently do in India and elsewhere. In this way we soon learn how to deal with them.

Malaria does certainly exist, but the Local Government has recently spent large sums of money in trying to eradicate this scourge.

and has succeeded to a considerable extent in doing so. If, however, the quality of the locality can be assessed by its indicating wood we have to quote one example, Mr. Bonington late of the forest service and one of the oldest residents—36 years in the Andamans and now 60 years of age—whose still persistently youthful appearance and unlimited energy will easily enable these Islands to be placed in Class I.

Area and Situation.—The Andaman Islands big and small are 204 in number with an area of 2,500 square miles. They are tucked away in the south-east of the Bay of Bengal between the latitudes of $15^{\circ} 41'$ and $10^{\circ} 30'$ north and the longitudes of $92^{\circ} 11'$ and $93^{\circ} 7'$ east. The smallest island is a few square yards in extent, just awash or submerged at high tide with half a dozen mangrove trees appearing to grow out of the depths of the sea. The biggest is the Middle Andaman with an extreme width of 19 miles and an extreme length of about 70 miles supporting a luxuriant growth of tropical evergreen and semi-evergreen vegetation rich in species and in value.

Configuration.—The configuration of these islands is very irregular with numerous ridges and knolls branching out in a confused manner from the main ranges of hills that generally run north and south. The higher range runs nearer the east coast rising up to 2,402 feet in Saddle Peak in North Andaman. There are no large rivers, and perennial streams are few. Level land is rare except along the coast or in the valley, usually only on either side of a stream.

Coast-line.—The coast line of the islands is greatly broken by deep indentations, some of which form excellent and well sheltered harbours. Tidal creeks, some of which are navigable for large steam launches, are numerous and run far inland dividing the islands into little narrow wooded belts which in places are only a few yards wide, thus creating a condition most ideal for the exploitation of the immense wealth that is locked up in these forests.

Climate.—The climate is warm and equable, the mean temperature in shade varying from 70° F. to 90° F. with a perceptible touch of cold during December and January when fogs and chilly nights

are common. In these months a heavy dew drips from the trees in the mornings as is the case in the Nilambur teak forests in the cold weather. February and March are often sultry with very little wind. South-west and north-east monsoons blow with regularity from May to October and from November to January. The average rainfall is about 150 inches a year, but varies to an extraordinary degree in places quite close to each other. Precipitation generally occurs every month, though the bulk of it falls from June to October. Cyclones rarely occur, though stormy weather conditions prevail at the beginning of the south-west monsoon in May-July, and also at the change of monsoons from the middle of October to the end of November.

Geology.—The islands are a southward extension of the Arakan Yoma range. The underlying rocks over the greater part of the islands are chiefly non-micaceous hard coarse-grained sandstone, indurated clays and slates, conglomerates, pale grey limestones and indurated and altered intrusions of serpentine. Coral formation is found along the coasts. Soft limestone chiefly of shell sand, soft calcareous sandstones, and white clays with occasional conglomerates are the chief rocks of the archipelago. The white clayey limestone cliffs almost surround Havelock Island and can be seen from a distance of some 25 to 30 miles.

Soil Formation.—The following types of soil formation are easily distinguished and are of considerable importance to the forester, as the distribution of different types of vegetation depends almost entirely on the presence or absence of a particular soil. This is especially so in the South and Middle Andamans. The main types of soil are :—

1. *Marsh alluvium.*—Fairly deep and formed by the clayey or sandy loam deposits brought down by rain water from the adjoining rising ground. This is found in all bays and creeks and along the coast line usually sheltered from the intensity of the monsoon winds. It is fairly extensive, forming about 18 per cent of the total area and is inundated at regular intervals by the rise and fall of the tides. This is entirely occupied by mangroves.

2. *Sandy beach*.—Raised by the action of wind and waves just above the reach of high tide, it consists chiefly of sand and shingles, mostly calcareous, lumps of old coral and broken shells. It is extremely porous and the streams coming down from the hills disappear here to emerge again at the sea line or in the sea. This type of formation is confined to the sea coast and is limited to narrow belts and strips. *Sea mohwa* (*Mimusops littoralis*) is the predominating species in this soil.

3. *Drained alluvium*.—Consists chiefly of deep fertile clayey loam or sandy loam formed in the same way as the marsh alluvium. It is out of reach of sea water and is found along the creeks above the marsh alluvium, or along the coast between the sandy beach and the hilly ground, along stream margins and in valleys and depressions. The extent of this formation is about five per cent of the total area. *Dipterocarpus alatus*, the most magnificent of all the Andaman trees, grows mostly on this soil.

4. *Low undulating ground with local padank soil*.—This is formed by the disintegration of indurated clays and shales, limestones and conglomerates, the matrix of which is mostly clayey and hard coarse grained non-micaceous sandstones. The soil varies from clayey loam to a coarse rubbly sandy loam and is very shallow in some places. There is no trace of visible humus. It is rich, but dry and waterless in the dry season, and gives rise to deciduous and semi-deciduous forests of great economic importance. The chief species is *padank* (*Pterocarpus dalbergioides*). Its distribution is confined to the lower slopes and the undulating ground between the alluvium and the hills and is by far the largest in area, about 45 per cent. It is rarely found beyond an elevation of 300 or 350 feet.

5. *Hills*.—The hills consist of stiff clayey soil or dark red loam overlying a micaceous sandstone formation and an intrusive serpentine. It is moist throughout the year and there is no scarcity of perennial springs, though the flow of water in the dry weather is small, chiefly due to the catchment areas being small. Typical tropical evergreen forests are found here, and the chief species of

economic importance, *Dipterocarpus grandiflorus*, grows here at its optimum.

Types of Vegetation.—Except for 70 square miles cleared for the Settlement the whole area from the water's edge to the summit of the highest peak is beset with a luxuriant growth of dense forest characteristic of a region of warm climate, heavy rainfall and high atmospheric humidity. Even armed with a *dah*—(Burmese cutting knife)—one finds it extremely difficult to clear a track. As a rule from the ground level up to 150 feet or more it is one mass of green vegetation tangled together by enormous climbers, thorny canes and the impenetrable climbing bamboo that carpets the lowest ground and festoons the highest trees. Scrub jungle on high hills and on very steep slopes is the only exception to this rule. Sir A. Rodger, late Inspector General of Forests, in his 'Tour of inspection in the Andaman Islands, 1927,' says that he has never seen a denser forest in any part of India or Burma.

The formation of different types of vegetation is purely edaphic and follows closely the classification of soils. Aspect, that can hardly be ignored in any other part of the world, has very little influence on modification of types in these islands. Except on closer examination and in dry months, the general character of the growth appears to be uniform throughout. Deciduous and evergreen forests grow on similar elevations, on similar aspects and in regions of similar rainfall, the sole deciding factor being the soil and the sub-soil.

The main types of forest in the Andamans are :—1. mangrove forests, 2. beach forests, 3. low evergreen forests, 4. hill evergreen forests and 5. deciduous and semi-deciduous forests. These types, although visibly distinct, merge into one another almost imperceptibly and take on the attributes to a large extent of neighbouring types into which a species has straggled. I have seen *padauk* (a distinctly deciduous tree) with its leaves still green in the low evergreen and the hill evergreen areas when the same species was absolutely leafless in deciduous areas. Mangrove is alone in its exclusiveness.

Mangrove Forest.—Mangrove forest occupies the marsh alluvium and is found lined up on either side of nearly all the creeks, on low islands and other coast lines sheltered from the force of the wind and waves. It extends as far as the high tide can reach, fringing the coast lines and occupying the lowest elevation. Of quite equal height growth and in some cases the crowns clipped like a flat topped hedge by parakeets, these forests with their heavy and vividly green foliage, are a very pleasing relief to the dreary expanse of the sea and form a beautiful setting for other types of vegetation on higher elevations.

Of the component species the most gregarious and predominating, *Rhizophora mucronata* and *R. conjugata*, are found almost exclusively on the outer limits facing the sea. Closely set and forming a very strong and effective sea wall with masses of stilt-like roots, they make penetration impossible. Immediately behind this or more correctly where the influence of fresh water is felt, are found two other species, *Bruguiera gymnorhiza* and *B. parviflora*. The former is the largest species of mangrove and next in abundance and gregariousness only to the *Rhizophoras* and gives the appearance of a well tended plantation with a clear bole 60-80 ft. high and a girth of 5-6 ft. and with a clean ground floor except for the numerous knee roots which make walking extremely difficult. These four species form very good fuel and are considered next best to coal by the crews of the steam launches. *Avicennia officinalis* with plentiful pneumatophores also forms occasional gregarious groups. Other species of true mangroves are about 15 in number but not so common. *Ceriops candolleana*, *Kandelia rheedii*, *Carapa obovata*, *C. moluccensis*, *Sonneratia acida*, *S. alba* and others are found dotted about everywhere. *Heritiera littoralis*, *Phoenix paludosa*, *Nipa fruticans*, *Licuala spinosa*, *Barringtonia racemosa*, *B. speciosa* and *Brownlowia lanceolata* form the outward fringe of the swamps that are reached only by the spring tide and gradually give rise to other types of vegetation. It is estimated that about 160 tons of timber per acre are available (Inspector-General of Forests' Note 1928) and the area occupied is roughly 450 square miles.

Beach Forest.—These are found lined along the coast in narrow belts from a few yards to a furlong or more in width, just above the high tide and exposed to the full force of the monsoon winds. They grow on sandy beach formed by sand and shingles banked up by wind and waves, and on the detritus brought down by streams. These forests act as very efficient shore protectors and wind belts especially on the west coast where the contorted appearance of the crown of *Mimusops littoralis*, the most predominating species of this formation, tells its own tale. On the loose knit sand often reached by high tide *Ipomoea biloba*, *Crinum asiaticum*, *Vigna retusa*, *Pandanus tectorius*, *Scaevola koenigii* and a few others form the only growth. Behind these and on firmer soil sometimes reached by high tide we have *Hibiscus tiliaceus*, *Morinda citrifolia*, *Thespesia populnea*, *Pongamia glabra*, *Desmodium umbellatum*, *Gyrocarpus americanus*, *Erythrina indica*, *Barringtonia speciosa*, *Calophyllum inophyllum*, *Terminalia catappa*, *Cordia subcordata*, most of these leaning out towards the sea and sometimes heavily laden with straggling shrubs and climbers such as *Calabrina asiatica*, *Caesalpinia bonducella*, *Mucuna gigantea* and various *Ipomoeas*. *Mimusops littoralis*, the towering giant of the littoral forest, sometimes grows pure on flat and deep sand deposits and provides a hard and durable timber. The total area of this type is negligible and is about one or two per cent of the total area.

Low Evergreen Forest.—Leaving the mangrove and beach formations, unless the ground rises abruptly we come to the low evergreen forests,—the densest in the Andamans. This type is confined mostly to the drained alluvium which forms the banks of larger streams, moist valleys and depressions and the inner extensions of tidal flats. It gives rise to a magnificent growth of species found both in deciduous and in evergreen areas, very often with huge buttresses. One such buttress of *padank* yielded a one-piece oval table 12' 9" by 7' for the late Lord Kitchener.

Dipterocarpus alatus, the biggest tree of the Andamans, with its usual associates *D. pilosus*, *Sterculia alata*, *S. campanulata*,

Terminalia bialata, *T. procera*, *Albizia stipulata*, *A. lebbek*, *Calophyllum spectabile*, *Bombax insigne*, *Artocarpus lakoocha*, *A. chaplasha* and *Pterocarpus dalbergioides* form the predominating species and occupy the topmost storey 100 feet and over. Below this forming the 2nd storey between 50-100 feet are found *Lagerstroemia hypoleuca*, *Dillenia pentagyna*, *Dracontomelum mangiferum*, *Pometia pinnata*, *Myristica irya*, and *Pisonia excelsa* with wood so soft as to form an excellent elephant fodder. There are also *Litsaea panamonja*, *Xanthophyllum andamanicum* and many others less important. Forming the lowest storey are found *Fagraea morindaefolia*, *Talau-ma andamanica*, *Garcinia andamanica*, *Macaranga tanarius*, and *Aporosa villosula*. The ground is usually covered with *Saprosma ternatum*, *Maesa andamanica*, *Micromelum pubescens*, *Clerodendron infortunatum*, *Leea sambucina* and *L. acuminata*, *Clinogyne grandis*, *Licuala peltata*, *Caryota mitis*, *Areca triandra*, and *Saccharum* in open places.

Of the climbers and straggling shrubs and canes, *Dinorchloa andamanica*, a climbing bamboo, *Thunbergia laurifolia*, *Ipomoea* sp., *Buettneria andamanensis*, *Combretum extensum* and *C. chinense*, *Daemonorops kurzianus*, *D. manii* and *Calamus palustris* form a rampant growth trailing over the ground and climbing into the highest trees. Only the top storey trees and a few in the second storey are really deciduous and that only for a short time.

Hill Evergreen Forest.—This is confined to the hills and ridges and to the eminences that emerge abruptly from the deciduous forests usually the outcrops of serpentine and sandstone formations. It is on these outcrops and on the lower slopes of the higher hills that we have the true and the most luxuriant growth of evergreen forests, the grandest of all the Andaman forest types. Every tree is clear boled and reaches enormous heights requiring field glasses to ascertain the form of the leaves. But, as we ascend higher to the ridges the height growth falls off and the trees become stunted and more numerous, dense and inextricably tangled with masses of climbers. The principal species, *Dipterocarpus grandiflorus* and *D. pilosus*, together with their associates *Artocarpus chaplasha* and *gomeziana*, *Calophyllum*

spectabile, *Planchonia andamanica*, *Hopea odorata*, *Endospermum malaccense*, *Sideroxylon longipetiolatum* and occasional *padauk* and *white dhup* (*Canarium euphyllum*) form the upper storey on the outcrops and on the lower slopes. *Dipterocarpus costatus*, *Mesua ferrea*, *Cratoxylon formosum*, and *Canarium manii* form the upper storey on hills and ridges and on higher slopes. *Xanthochymus andamanicum*, *Myristica andamanica* and *glauca*, *Baccaurea sapida*, *Croton argyratus*, *Pterospermum accroides*, *Caryota mitis*, *Cryptocarya*, *Memecylon*, *Euphorbia* and small bamboos form the second storey. Small trees are few, *Mitrephora prainii* and *Actephila excelsa* being the chief.

The chief climbers are *Dinorchloa andamanica*, *Calamus palustris*, *Gnetum scandens*, *Ancistrocladus extensus* and a few others that connect the crowns above and lie in snake-like coils on the ground below.

Deciduous and Semi-deciduous Forests.—Rising from the mangrove, the beach or the low evergreen forests and covering all the undulations and extending 300 feet or more up the hills and ridges as far as the soil conditions permit, these forests form the most important reserves of timber wealth of these islands. It covers as much as 45 or 46 per cent of the total area. *Padauk*, the most important and predominating timber species of these islands, with its equally important associates, *Terminalia bialata*, *Terminalia manii* and *Terminalia procera*, *Canarium euphyllum*, *Sterculia campanulata*, both much in demand as match wood, *Bombax insigne*, *Lagerstroemia hypoleuca*, *Tetrameles nudiflora*, *Chukrasia tabularis* and in moist localities *Artocarpus chaplasha*, *Dipterocarpus alatus*, *Parishia insignis*, *Bassia butyracea*, and *Albizzia lebbek* form the topmost storey above 125 feet in height. These trees with their huge buttresses especially in the case of *Tetrameles nudiflora*, *padauk* and *Terminalia bialata* are placed far apart and their widespread crowns rarely touch one another. Below these giants and forming the second storey above 50 feet and making a complete canopy are *Lannea grandis*, *Adenanthera pavonina*, *Sterculia villosa*, *Dillenia pentagyna*, *Diospyros marmorata*, the beautiful Zebra wood *Diospyros pilosula*, *D. pyrrhocarpa*, *Millettia tectona*, *Sageraea elliptica*, *Cratoxylon formosum*, *Semecarpus kurzii*,

Zanthoxylum budrunga, *Celtis wightii* and *Cinnamomum zeylanicum*, *C. obtusifolium*, and *Pterospermum aceroides*. Below these forming the third storey are found *Murraya exotica* (which by the way makes fine walking sticks) *Atalantia monophylla*, *Limonia alata*, *Cohnawallichii*, *Canthium gracilipes*, *Ixora grandiflora*, *Grewia laevigata* and the small bamboos *Oxytenanthera nigrociliata* and *Bambusa schizostachyoides*.

Of the shrubs covering the ground the most common are *Alsodeia bengalensis*, *Mallotus acuminatus*, *Actephila excelsa*, *Randia longiflora*, *Harrisonia brownii* H. bennettii, *Glycosmis pentaphylla* and *Licuala peltata*.

The most common climbers and straggling shrubs that connect these different tiers in the canopy are *Ventilago madraspatana*, *Delima sarmentosa*, *Buettneria andamanensis*, *Acacia pennata*, *Entada scandens*, *Plecospermum andamanicum* and *Sphenodesme unguiculata*. There are also a variety of canes.

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3. Troup's Silviculture of Indian Trees.

(To be continued.)
